Appl. No. 10/006,992   <u>PATENT</u>
Amendment dated 21 December 2004
Amendment under 37 CFR 1.116 Expedited Procedure
Examining Group 3739

<div align="center"><u>REMARKS/ARGUMENTS</u></div>

Claims 18-20 and 36-42 are pending in this rejection and stand substantively rejected. Claims 1-17 and 21-35 were previously canceled. Reconsideration of the pending claims is respectfully requested. The Office Action Summary indicates that the Office Action of October 21, 2004 is non-final, although page 3 states that it is a final Office Action. Applicants hereby file the instant Response assuming that the Office Action is final, and ask the Examiner to confirm the finality of the Action.

<u>Rejection under 35 U.S.C. §102</u>

Claims 18, 19, 40, and 42 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,563,105 to Seibel et al. ["Seibel"]. Applicants traverse this rejection.

MPEP 2131 establishes that to anticipate a claim, a reference must teach every element of the claim. Seibel fails to meet this test. Presently pending claim 18 recites a method for determining an accuracy of a gradient array in an optical tissue. The method includes the steps of (i) transmitting an image through the optical tissue, (ii) determining local gradients of the array from the transmitted image, and (iii) integrating along a closed integration path across a portion of the array.

Applicants' claims encompass novel methods involving transmitting light *through* optical tissues. Rather than simply generating surface information, the methods of the present invention will allow the optical properties of the underlying optical system to be characterized. The gradients measured when transmitting light through an ocular optical system do not necessarily correspond exactly to an outer surface of the cornea, as aberrations may be imposed by sub-surface defects.

Seibel reports image acquisition devices with depth enhancement features. Seibel's devices characterize *surface features* of a selected target. For example, Seibel discusses a flow chart for generating an output image with enhanced depth information (col. 15, lines 11-13). This output image is based on light returning from a *target surface* (col. 15, lines 20-21 and

46-48). Relatedly, Seibel describes an orientation map for recovering the *shape* of an object being imaged (col. 16, lines 17-20). In fact, Seibel describes a depth map as follows.

> *With regard to step 218, the depth map then is derived from the orientation map. A depth map represents the shape of the object in a different manner. Specifically, rather than specifying orientation information, the depth map specifies relative height above a reference plane. The depth map is a gray-scale image with black representing the lowest heights and white as the highest. The height z of a pixel (x,y), or z(x,y), is a function of the gradients of the corresponding orientation values f and g. Given f and g, the depth z can be recovered by integrating along arbitrary curves*

$$z(x, y) = z(x_0, y_0) + \int_{(x_0,y_0)}^{(x,y)} (f dx + f dy)$$

> *Along a closed path, the integral should equal zero. In practice, f and g are imprecise because they are recovered from noisy image data. Optimization techniques, such as global integration or iterative Laplacian relaxation techniques are able to recover smooth surfaces from noisy orientation maps.* (Col. 17, lines 16-32) (Emphasis added)

Hence, Seibel seeks to identify topical **surface** features of an object. Further, the closed Seibel path is a path along a surface and thus reflects surface features only. As Applicants understand Seibel, there is no reasonable teaching or suggestion that light instead be transmitted through an optical tissue that is being characterized, that gradients be measured of the light transmitted through the surface, or that integration occur across the measured gradients of light transmitted through the surface. Thus, Seibel does not teach or suggest transmission of an image through an optical tissue as presently claimed.

The Office Action's explanation of why Seibel anticipates the presently claimed invention appears incomplete, and is contradicted by the Examiner's own analysis of the reference. The Action provides the following remarks in support of the alleged anticipation of claim 18:

> *Use of the method on a cornea that has been recurved will map an*
> *"error correcting change" integrating close path requires the use of at*
> *least 3 points.* (Office Action at p. 2)

This statement does not properly establish *prima facie* anticipation by showing how Seibel teaches each and every element of claim 18. In fact, on page 3, lines 2-3 of the Office Action, the Examiner acknowledges the reference does not teach the claimed method, stating that "Seibel et al teach a method [...] except the transmission through optical tissue [...]." (Emphasis added).

In sum, Applicants respectfully submit that Seibel fails to teach or reasonably suggest *any* of the method steps as recited in claim 18. Seibel fails to teach or reasonably suggest a method of determining an accuracy of a gradient array in which an image is transmitted through an optical tissue, and/or in which local gradients of the array are determined from the transmitted image, and/or in which integration occurs along a closed integration path across a gradient array from such an optical tissue.

Claims 19, 40, and 42 depend from claim 18, and are therefore allowable as depending from an allowable base claims, as well as for the novel combination of elements they recite. Withdrawal of this rejection is respectfully requested.

First Rejection under 35 U.S.C. §103

Claims 18, 20, 40, and 41 were rejected under 35 U.S.C. § 103(a) as allegedly obvious in view of U.S. Patent No. 6,373,918 to Wiemker et al. ["Wiemker"]. Applicants traverse this rejection.

According to MPEP 2143, a *prima facie* case of obviousness requires that (i) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to the artisan, to modify the reference or to combine reference teachings; (ii) there must be a reasonable expectation of success; and (iii) the cited reference (or references when combined) must teach or suggest all the claim elements.

As noted above, presently pending claim 18 recites a method for determining an accuracy of a gradient array in an optical tissue. The method includes the steps of (i)

transmitting an image through the optical tissue, (ii) determining local gradients of the array
from the transmitted image, and (iii) integrating along a closed integration path across a portion
of the array.

      Applicants' claims encompass novel methods involving transmitting light
through optical tissues. Rather than simply generating surface information, the methods of the
present invention will allow the optical properties of the underlying optical system to be
characterized. The gradients measured when transmitting light through an ocular optical system
do not necessarily correspond exactly to an outer surface of the cornea.

      Wiemker describes a method for detecting object contours in an X-ray image.
For example, Wiemker's invention is described as intended for structures having high X-ray
absorption as follows:

> *The invention relates to a method for automatically detecting the*
> *contours of structures having a high X-ray absorption in an X-ray*
> *image. The invention also relates to an X-ray apparatus for carrying*
> *out such a method.* (Col. 1, lines 6-9)

      X-ray technology is based on the principle that certain materials such as calcium-
rich bone readily absorb X-ray photons, whereas other materials such as soft tissue allow X-ray
photons to pass through unaffected. Wiemker describes methods of detecting contours of highly
absorptive materials. There is no suggestion provided by Wiemker or the Office Action that X-
rays passing though optical tissue would provide any information or image that could be used to
determine a gradient array of the optical tissue, particularly one which need not reflect only a
single surface shape or contour. Thus, even if Wiemker were applied as the Office Action
suggests, the reference would still fail to render presently pending claim 18 as obvious.

      In sum, obviousness is not established because there is no suggestion or
motivation, either in the Wiemker or in the knowledge generally available to the artisan, to
modify Wiemker as suggested by the Office Action, nor is there a reasonable expectation of
success for the suggested modification, nor does the suggested modification teach or suggest all
the claim elements.

According to the Office Action, the artisan would have found it obvious to employ Wiemker's method on a patient's head X-ray, thus producing the presently claimed invention. Applicants respectfully submit that this interpretation is contrary to the X-ray technology actually described in the reference, which is intended to detect contours of structures having high X-ray absorption, as discussed above.

Claims 20, 40, and 41 depend from claim 18, and are therefore allowable as depending from an allowable base claims, as well as for the novel and nonobvious combination of elements they recite. Withdrawal of this rejection is respectfully requested.

Second Rejection under 35 U.S.C. §103

Claims 20, 37-39, and 41 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Seibel in combination with U.S. Patent No. 6,280,435 to Odrich et al. ["Odrich"] and U.S. Patent No. 6,486,943 to Burns et al. ["Burns"]. Applicants traverse this rejection.

Presently pending independent claim 18, from which claims 20, 37-39, and 41 directly or indirectly depend, recites a method for determining an accuracy of a gradient array in an optical tissue. The method includes the steps of (i) transmitting an image through the optical tissue, (ii) determining local gradients of the array from the transmitted image, and (iii) integrating along a closed integration path across a portion of the array.

To properly establish a *prima facie* case of obviousness, the Office is required to show (i) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to the artisan, to modify the reference or to combine reference teachings; (ii) there must be a reasonable expectation of success; and (iii) the cited reference (or references when combined) must teach or suggest all the claim elements.

As noted above, Seibel reports image acquisition devices with depth enhancement features that are limited to *surface features* of a selected target. For example, Seibel discusses an output image that is based on light returning from a *target surface*. Relatedly, Seibel describes an orientation map for recovering the *shape* of an object being imaged. The depth map described by Seibel specifies relative height above a reference plane.

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Odrich appears to be cited for the proposition that mapping the surface contour of the cornea with a spatially resolved refractometer is known. Similarly, Burns appears to be cited for the proposition that spatially resolved refractometers that transmit images through the cornea are known. Yet, both of these references fail to teach or suggest transmitting an image through the optical tissue, determining local gradients of the array from the transmitted image, and integrating along a closed integration path across a portion of the array. Hence, these references do not make up for the failings of the Seibel reference.

Therefore, the combination of Seibel, Odrich, and Burns fails to teach or suggest each of the presently claimed elements. According to the Office Action:

> *It would have been obvious to employ the refractometer of Burns in the method of Odrich et al and to produce the contour data by the close integration path method of Seibel et al, since Odrich et al discusses no method to produce the contour data, thus producing a method such as claimed.*

The Examiner's rationale to combine Odrich with Seibel (i.e. because Odrich fails to describe contour data) is improper. First, it appears Odrich does in fact discuss mapping contours (see col. 13, line 65 to col. 14, line 10). Second, that a reference fails to teach an element does not automatically provide motivation to combine it with a reference that does teach the element.

Because the combination of the cited references fails to teach all elements of the presently claimed invention, and because there is no motivation to combine these references to arrive at the presently claimed invention, withdrawal of this rejection is respectfully requested.

Claim 36

The Office Action Summary states that claim 36 is rejected, however the Detailed Action provides no explanation as to why. If the rejection is maintained, Applicants respectfully request clarification regarding the grounds upon which the rejection is based.

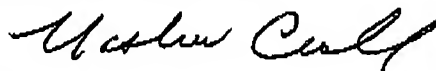## CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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